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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/591,226

06/11/2007

Lars V. Nielsen

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EXAMINER

BALDRIDGE, BENJAMIN M

ART UNIT

PAPER NUMBER

2831

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/591,226	<b>Applicant(s)</b> NIELSEN ET AL.	
	<b>Examiner</b> Benjamin M. Baldrige	<b>Art Unit</b> 2831	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 31 August 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1 - 11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 - 11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 August 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>9 May 2007</u> .  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

1. Claims 1 – 11 are presented for examination.

#### ***Priority***

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

#### ***Drawings***

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description:

Figure 2A: item 26, mentioned in the specification, not found in Figure 2A.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

4. The drawings are objected to because of insufficient explanation of the function of the various parts of the circuit shown in Figure 2B. This drawing is also objected to because of poor print quality. See 37 CFR 1.84(p)(3). Corrected drawing sheets in

compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

5. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

6. Presence in the specification of Annexes 1 – 5, starting on Page 29 of the specification is improper. Applicant is reminded of the requirements for the specification, as set forth in MPEP:

- (i) Detailed Description of the Invention: See MPEP § 608.01(g). A description of the preferred embodiment(s) of the invention as required in 37 CFR 1.71. The description should be as short and specific as is necessary to describe the invention adequately and accurately. Where elements or groups of elements, compounds, and processes, which are conventional and generally widely known in the field of the invention described and their exact nature or type is not necessary for an understanding and use of the invention by a person skilled in the art, they should not be described in detail. However, where particularly complicated subject matter is involved or where the elements, compounds, or processes may not be commonly or widely known in the field, the specification should refer to another patent or readily available publication which adequately describes the subject matter.

7. The disclosure is objected to because of the following informalities:

Page 1, line 18: the phrase "all is hereby incorporated" will be taken to read "all are hereby incorporated".

Page 7, line 22: the phrase "the coupons is excavated" will be taken to read "the coupons are excavated".

Page 18, line 20: reference to "a processing unit 26" has no corresponding item identified in Figure 2a.

Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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9. Claims 1 - 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nielsen et al. (US Patent Application Publication Pub. No. US 2003/0006148 A1, January 9, 2003, hereinafter referred to as Nielsen) and in view of Pierre et al. (US Patent Application Publication Pub No. US 2003/0169058, Pub. Date September 11, 2003, hereinafter referred to as Pierre) and further in view of Carr et al. (US Patent 5,821,742, October 13, 1998, hereinafter referred to as Carr).

As to claim 8, Nielsen discloses an apparatus for measuring accumulated rate of material loss having substantial features of the claimed invention, including:

**A measuring apparatus** (Abstract, lines 1 – 3; [0006], lines 1 – 6; note that the object of the invention is described as “to provide an apparatus and method for measuring accumulated and instant rate of material loss or material gain.)

**A two-part metal probe** (Figure 2, item 10, 18, 20; note two parts separated by wire or cable connecting them);

**A first probe part having a first metal element of a first size and a first specific resistivity, said first probe part constituting an exposed element** (Figure 2, item 20; also [0082], lines 7 - 10. Note that metals have intrinsic resistivity, specific to the type of metal used; note also two part probe shown in Figure 2, one part coated, one uncoated, as described in [0012], lines 1 - 7);

**A second probe part having a second metal element of a second size and a second specific resistivity** (Figure 2, item 18; also [0082], lines 4 -6);

**said second probe part being hermetically sealed and constituting a reference element, and having a cable for connection to an external measuring apparatus** ([0088], lines 8 – 11; note that second probe part is coated, as described in [0012], lines 1 - 7. The term "hermetically sealed is taken to mean "completely sealed", as defined in the American Heritage Dictionary of the English Language. In order for the apparatus disclosed in Nielsen to work, the reference electrode must be sealed against the effects of corrosion, in order to measure the difference between the corroded and uncorroded probe parts).

**A cable connector for the connection of said cable of said two-part metal probe to said external measuring apparatus included within said housing** ([0088], lines 3 – 7; Figure 3, items 28a, 28b);

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**A current excitation circuit ([0088], lines 3 - 5) for passing through said cable a first excitation current to said first probe part and for measuring the voltage generated by said first excitation current across said first probe part for measuring the resistance of said first probe part according to Ohm's Law ([0088], lines 3 - 11) and for passing a second excitation current through said cable to said second probe part and for determining the voltage generated by said second excitation current across said second probe part for measuring the resistance of said second probe part according to Ohm's Law ([0088], lines 3 - 11. Note explicit mention of voltages measured through voltage sensitive means 32 and 34, connected to a common connector 30),**

**Storage means for storing the measurements made by said AC current measuring circuit, said AC voltage measuring circuit, said spread resistance measuring circuit and said current excitation circuit, ([0177], lines 7 - 11. Note that Nielsen explicitly teaches the use of internal or external storage means to store measurement data in lines 7 - 11);**

**A diagnosing circuit for diagnosing the risk of corrosion in said pipe ([0183] lines 1 - 5; note use of processor for calculating degree of metal loss or gain, a measure used to diagnose the risk of corrosion in an underground pipe, as shown in equation in [0183]).**

Nielsen does not disclose:

**An AC current measuring circuit for measuring the AC current flowing between a pipe or pipeline and the two-part metal probe when said probe is buried in said soil.**

**An AC voltage measuring circuit for measuring the AC voltage between said pipe or said pipeline and said two-part metal probe when said two-part metal probe is buried within said soil.**

**A resistance measuring circuit connected to said AC current measuring circuit and said AC voltage measuring circuit for determining the spread resistance based on Ohm's Law.**

Pierre discloses:

**an AC current measuring circuit for measuring the AC current flowing between a pipe or pipeline and the two-part metal probe when said probe is buried in said soil, ([0093], lines 6 - 12; note explicit mention of measurement of current between the structure and measuring electrodes; the structure referred to here is an underground pipe, as is made clear in the abstract and elsewhere in Pierre);**

**an AC voltage measuring circuit for measuring the AC voltage between said pipe or said pipeline and said two-part metal probe when said two-part metal probe is buried within said soil** (Abstract, lines 12 – 14; Figure 1, item 51; [0045], lines 12 – 19; note also explicit mention of AC and DC currents in line 8 of [0045]. Note also that AC voltage measurement is also taught explicitly by Nielsen, in [0088], lines 3 - 11, as discussed above);

**a resistance measuring circuit connected to said AC current measuring circuit and said AC voltage measuring circuit for determining the spread resistance based on Ohm's Law** ([0067], lines 12 – 17; note also equation 1 in [0067], which shows explicit calculation of resistance based on currents and voltages).

Given the teaching of Pierre, a person of ordinary skill in the art at the time of the invention would have readily recognized the desirability and advantages of modifying the teaching of Nielsen by employing an AC current measuring circuit, an AC voltage measuring circuit, and a resistance measuring circuit, to monitor and measure voltage, current and resistance differences in metal probes, as an indication of the degree of corrosion in underground pipes.

Although Nielsen and Pierre disclose substantial features of the claimed invention, they fail to disclose:

**A housing.**

Carr discloses:

**A housing** (Figure 1a, 1b, item 10; note also Column 5, lines 43 - 44).

Given the teaching of Carr, a person of ordinary skill in the art at the time of the invention would have readily recognized the desirability and advantages of modifying the teaching of Nielsen and Pierre by employing a housing to contain a measurement apparatus to monitor and diagnose the presence and extent of corrosion in underground pipes.



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As to claim 1, the method disclosed in the instant claim is intrinsic to the apparatus disclosed in claim 8, as discussed above, since the method steps will be met during the normal operation of the apparatus stated above.

10. As to claims 9 – 11, Nielsen discloses an apparatus having:

**said measuring apparatus includes a micro processor constituting part of said AC current measuring circuit, said AC voltage measuring circuit, said spread resistance measuring circuit, said current excitation circuit, said storing circuit: and said diagnosing circuit, said micro processor controlling the overall operation of the apparatus for periodically repeating the measurements** [claim 9] ([0177], lines 1 – 11; also [0176], lines 12 – 17. Note explicit mention of microprocessors for calculating values of for corrosion parameters; note also operations performed by the apparatus may be implemented in any configuration of hardware and software, as stated in [0176], lines 12 - 17).

**Said measuring apparatus includes two or more cable connectors** [claim 10] ([0012], lines 2 – 6; note mention of first, second and third connectors; also [0018], lines 1 - 9);

**Said measuring apparatus further includes a data connector for connecting to an external device** [claim 11] ([0177], lines 8 - 11; note that control unit in Nielsen comprises internal or external storage means, strongly implying a data connector, since no storage in an external device is possible without a data connection to the apparatus. Note also mention of operator input of time period and number of measurements in [0179], which cannot be performed without some form of data connector).

11. As to claim 2, Nielsen discloses:

**Said first probe part and said second probe part having identical metal elements** ([0020], lines 14 – 16; [0021], lines 11 – 13, which disclose an interface that defines a boundary between the coated and non-coated parts of the probe, constituted by one metal piece. Note also that Figures 1, 3 – 9 show a single probe made up of what appear to be identically sized first and second parts).

As to claim 3, Nielsen discloses:

**Said step x being performed in accordance with the following equation:**

$$\sigma(t) = \sigma(t = 0) \cdot \frac{R_R(t)}{R_C(t)} \cdot \frac{R_C(t = 0)}{R_R(t = 0)}$$

([0183], last line; note that Nielsen discloses the use of this formula (algorithm) for calculating the degree of metal loss (corrosion) of the metal element, i.e. the uncoated part of the probe).

As to claims 4 – 7, Nielsen discloses:

**Said spread resistance being high provided the value of said spread resistance being above 0.1 – 1 Ohm and being low provided the value of said spread resistance being below 0.1 – 1 Ohm.** [claim 5] ([0177], lines 6 – 10; note that Nielsen discloses calculation of values for corrosion parameters based on measured data, and operations implemented in any configuration of hardware and software, in [0176], lines 13 – 17. The limitations in these claims are only considered to be optimum values of spread resistance, and a person of ordinary skill in the art at the time of the invention would have been able to determine these values using only routine experimentation based on desired accuracy and predictive value. See *In re Boesch*, 205 USPQ 215 (CCPA, 1980)

**Said AC voltage being high provided said voltage higher than approximately 10V** [claim 6] ([0177], lines 6 – 10; note that Nielsen discloses calculation of values for corrosion parameters based on measured data, and operations implemented in any configuration of hardware and software, in [0176], lines 13 – 17. The limitations in this claim is only considered to be an threshold value of AC voltage, distinguishing between high and low voltage, and a person of ordinary skill in the art at the time of the invention would have been able to determine these values using only routine experimentation based on desired accuracy and predictive value. See *In re Boesch*, 205 USPQ 215 (CCPA, 1980);

**Said steps iii, iv, v, vi, and viii being repeated with a frequency of one or more days** [claim 7] [0179], lines 8 – 12; note explicit mention of number of measurements to be determined by the operator, and a time period (days, hours and minutes) specified as defining the duration of the measurement. Note also that repetition of a measurement is not a patentable feature in and of itself).

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As to the diagnosis values shown in the table in claim 4, the limitations in this claim are only considered to be optimum values of spread resistance at a given AC voltage, with indications of possible corrosion conditions based on those values, and a person of ordinary skill in the art at the time of the invention would have been able to determine these values using only routine experimentation based on desired accuracy and predictive value. See *In re Boesch*, 205 USPQ 215 (CCPA, 1980).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Benjamin M. Baldrige whose telephone number is 571 270 1476. The examiner can normally be reached on Monday through Friday 7:30AM to 5:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez can be reached on 571 272 2245. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Diego Gutierrez/

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Supervisory Patent Examiner, Art Unit 2831

/Benjamin M Baldrige/  
Examiner, Art Unit 2831